

# THE HEREDITY OF RICHARD ROE.

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"Vom Vater hab' ich die Statur." <sup>1</sup> — *Goethe.*

WHEN Richard Roe was born, "the gate of gifts was closed" to him. Henceforth he must expect nothing new, and must devote himself to the development of the heritage he has received from his father and mother. He must bring its discordant elements into some sort of harmony. He must form his Ego by the union of these factors. He must soften down their contradictions. He must train his elements of strength to be helpful to some one in some way, that others in turn may be helpful to him. He must give his weak powers exercise, so that their weakness shall not bring him disaster in the competition of life. For somewhere, somehow, in his life it will prove that no chain is stronger than its weakest link. Other powers not too weak, nor over strong, Richard Roe must perforce neglect, because in the hurry of life there is not time for all-round development. In these ways the character of Richard Roe's inheritance is steadily changing under his hands. As he grows older, one after another of the careers that might have been his, vanish from his path forever. The man he might have been can never be. On the other hand, by steady exercise a slender thread of capacity may grow so as to become like strong cordage. Thus Richard Roe learns anew the old parable of the talents. The power he hid in a napkin is taken away altogether, while that which is placed at usury is returned a hundred-fold.

Now, for the purposes of this discussion, thou, gentle reader, "who art an achievement of importance," or I, ungente writer, concerning whom the less said the better, may be Richard Roe. So might any of your friends or acquaintances. So far as methods and laws are

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1 Stature from Father and the mood,  
Stern views of life compelling;  
From Mother I take the joyous heart  
And the love of story-telling.

Great grandsire's passion was the fair;  
What if I still reveal it?  
Great granddam's pomp and gold and show,  
And in my bones I feel it.

Of all the various elements  
That make up this complexity,  
What is there left when all is done,  
To call originality?

— Goethe, *Zahme Xenien*, VI; Bayard Taylor's translation, in part.

concerned, Richard Roe may be your lapdog or your favorite horse, — or even your *bête noire*, if you cherish beasts of that character. Any beast will do. With Algernon Fitz Clarence De Courcy or Clara Vere de Vere the case would be just the same. Let Richard Roe stand at present for the lay figure of heredity, or, if it seem best to you to humanize this discussion, let him be a *Man*.

The man Richard Roe enters life with a series of qualities and tendencies granted him by heredity. Let us examine this series. Let us analyze the contents of this pack which he is to carry through life to the gates of the Golden City. In this analysis we may find help in the use of the formulæ of algebra, a science which, like heredity, deals with unknown quantities standing in definite relations to each other.

First, from his parents Richard Roe has inherited humanity, the parts and organs and feelings of a man. "Hath he not eyes? Hath he not hands, organs, dimensions, senses, affections, passions? fed with the same food, hurt with the same weapons, subject to the same diseases, healed by the same means, warmed and cooled by the same winter and summer" as you or I or any other king or beggar we know of? "If you prick us, do we not bleed? if you tickle us, do we not laugh? if you poison us, do we not die? and if you wrong us, shall we not revenge?" All this, the common heritage of Jew or Gentile, goes to the making of Richard Roe. His ancestors on both sides have been human, and that for many and many generations, so that "the knowledge of man runneth not to the contrary." Even the prehuman ancestry, dimly seen by the faith of science, had in it the potentialities of manhood. Descended for countless ages from man and woman, man born of woman, Richard Roe surely is. We may go farther with certainty. Richard Roe will follow the race-type of his parentage. If he is Anglo-Saxon, as his name seems to denote, all Anglo-Saxon by blood, he will be all Anglo-Saxon in quality. To his characters of common humanity we may add those proper to the race. He will not be Negro nor Mongolian, and he will have at least some traits and tendencies not found in the Latin races of southern Europe.

But his friends will know Richard Roe best, not by the great mass of his human traits nor by his race characteristics. These may be predominant and ineradicable, but they are not distinctive. To them he will be a Roe rather than an Anglo-Saxon. He must be known by his peculiarities, — by his specialties and his deficiencies. Within the narrowest type there is room for the broadest play in the minor variations. For almost any possible one of these Richard Roe could find warrant in his ancestry. Only his combination of them must be his own. That is his individuality. Color of the eyes and hair, length of nose, hue of



skin, form of ears, size of hands, character of thumb-prints,—in all these and ten thousand other particulars, some allotment must fall to Richard Roe.

He must have some combination of his own, for nature has “broken the die” in moulding each of his ancestors and will tolerate no servile copy of any of her works. By the law of sex, Richard Roe has twice as many ancestors as his father or mother had. Therefore these could give him anything they had severally received from their own parents. The hereditary gifts must be divided in some way, else Richard Roe would be speedily overborne by them. Furthermore any system of division nature may adopt could only be on the average an equal division. Richard Roe’s father could say, “With half my qualities I thee endow,” his mother furnishing the other half. Nature tries to arrange for some partition like this. But she can never divide evenly. Besides, some qualities will not bear division. Richard Roe’s share forms a sort of mosaic, made partly of unchanged characters standing side by side in new combinations, partly a mixture of characters, and, in part, characters in perfect blending.

The physical reason for all this, science is just beginning to trace. The machinery of division and integration it finds in the germ-cell itself—the egg and its male cognate. At the same time it finds that nature’s love of variation is operative even here. She has never yet made two eggs or two sperm-cells exactly alike.

The germ-cell, male or female, — and the two are alike in all characters essential to this discussion, — is one of the vital units or body-cells set apart for a special purpose. It is not essentially different from other cells, either in structure or in origin. But in its growth it is capable of repeating, “with the precision of a work of art,” the whole organism from which it came. The germ-cell is made up of protoplasm, a jelly-like substance, less simple than it appears, not a “substance” at all, in fact, but a structure as complex as any in nature. In connection with protoplasmic structure all known phenomena of life are shown. Inside the germ-cell, or in any other cell, is a smaller cellule called the nucleus. In connection with the nucleus appear most of the phenomena of hereditary transmission. In the higher animals its structure is a complicated arrangement of loops and bands, the substance of which these are made being called chromatin. This name, chromatin, is given because its substance takes a deeper stain or color (in Greek, *chroma*) than ordinary protoplasm or other cell-materials. In the chromatin, it is supposed, are the determinants of heredity, and these preside in some way over all movements and all changes of the protoplasm.

In the fertilized egg, the mixed chromatin of the two cells which have been fused into one may be said to contain the architect’s plan

after which the coming animal is to be built up. In the mixed chromatin of the cell which is to grow and to divide, to separate and integrate, till it forms Richard Roe, the potentialities of Richard Roe all lie in some way hidden. How this is we cannot tell. We know that the structure of a single cell is a highly complex matter, more complex than the Constitution of the United States, with a far more perfect system of checks and balances. When we can understand all that takes place in a single cell we shall "know what God and Man is." It is not, like the Constitution of our nation, a simple written document with definite powers and definite limitations. It may rather be compared to the unwritten constitution of civilization, and a single cell may hold in potentiality even all that this supposed constitution may embrace.

It is not easy, for example, to understand how Richard Roe's tone of voice, or the color of his hair, or his ear for music, or other hereditary qualities can be thus hidden. But so they seem to be, and if science should stop whenever she came to a mystery, the growth of knowledge would be hemmed in very narrowly indeed.

When nature is getting the germ-cells ready this hereditary material is increased in each one, and then again divided and subdivided, till in the ripened cell but half the usual amount is present. The cell is then ready to unite with its fellow of the opposite sex to form a perfect cell. From this, under favorable circumstances, the great alliance of cells which constitute the body of Richard Roe is built up.

Nature makes her divisions evenly enough, but never quite equally. She is satisfied with an approximate equality, better satisfied than if she could make a perfect division. She knows no straight lines; she never made a perfect sphere, and she takes the corner away from every angle. It satisfies her desire for likeness to have her children almost alike. Exact symmetry would exclude variation, for which she cares still more, and for good reason. If her creatures are left unlike, it is so much the easier for her to find places for them in the crowded world of life. Moreover, unlikeness gives play for selection. She can save her favorites and discard her failures.

So in the chromatin of his two parent cells Richard Roe finds his potentialities, his capacities, and his limitations. But latent in these are other capacities and other limitations, handed down from earlier generations. Each grandfather and grandmother has some claim on Richard Roe, and, behind these, dead hands from older graves are still beckoning in his direction. The past will not let go, but with each generation the dust or the crust grows deeper over it. Moreover, these old claims grow less and less with time, because with each new generation there are twice as many competitors. Besides this, as we



shall see beyond, these past generations can make no claim on him except through the agency of his own parents.<sup>1</sup>

Out of these elements Mr. Galton frames the idea of a "mid-parent," a sort of centre of gravity of heredity, which in language, not algebra, would represent the same set of ideas. But, as Dr. Brooks has observed, "It may be well to ask what evidence there is that the child does inherit from any ancestor except its parents, for descent from a long line of ancestors is not necessarily equivalent to inheritance from them, and it is quite possible that the conception of a 'mid-parent' may be nothing but a logical abstraction." The parents of Richard Roe were his father and mother, not his grandfather or grandmother, nor yet the whole human race, in one of the chains of which he forms a single link. When a son inherits his maternal grandfather's beard it is really his mother's beard which he acquires. It is the beard which his mother would have had, had she been a man.<sup>2</sup>

The personal peculiarities recognizable in the father are different

<sup>1</sup> We may sum up Richard Roe's inheritance in algebraic formulae as follows:

Let A be the aggregate of species and race characters inherited from the father. Let A' be the species and race characters inherited from the mother. Then  $\frac{A + A'}{2 + 2}$ , as  $A = A'$ , will be simply

A. A forms the greater part of Richard Roe in numerical aggregate, but in the Anglo-Saxon race it is an invariable quantity, and therefore not of importance in making up the characters by which we know him from his fellows.

Let B be the recognizable peculiarities of the father, and B' the recognizable peculiarities of the mother. How shall these be divided? Obviously not more than  $\frac{B + B'}{2 + 2}$  could go to Richard Roe,

for his body cannot be made up exclusively of peculiarities. We may infer from Galton's studies, that these figures are in excess of the fact. In each process of generation, half these qualities, already once divided, are lost or rendered unrecognizable. To each parent, Galton assigns about twenty-five per cent of these personal qualities. Accepting this as approximate,  $\frac{B}{4} + \frac{B'}{4}$  would be

nearer the actual fact, and we may so take it. But the latent influence of the grandparents must come in, these represented by C, C', C'', and C''', respectively. In this case the divisor may apparently be 16, which corresponds to Galton's estimate of 6½ per cent. Should we wish to go farther back, the influence of the great-grandparents, D, D', D'', etc., eight of them, could be added, each with 64 as its divisor.

It is evident that these divisors are all proximate only, and varying at each cleavage of the germinal chromatin. The unknown and fluctuating element in this division we may designate as

$\pm n$ . Hence  $\frac{B}{4 \pm n}$  would represent the direct heritage from his father to Richard Roe. Then  $A + \frac{B}{4 \pm n} + \frac{B'}{4 \pm n} + \frac{C}{16 \pm n^2} + \frac{C'}{16 \pm n^2} + \frac{C''}{16 \pm n^2} + \frac{C'''}{16 \pm n^2} + \frac{8 D \text{ etc.}}{64 \pm n^3} + \frac{16 E \text{ etc.}}{256 \pm n^4}$ , etc., will be our first rough draft of the hereditary framework of Richard Roe.

<sup>2</sup> In that case the formula given in the above note would be modified to this extent: the value of C, D, E, etc., would be limited to the hereditary characters latent but undeveloped in B, etc. Their value would be less than B, for some part of B would have to be subtracted from each of them. For it is evident that the inheritance from the grandparents and from far-off ancestors came through the parents. If not active in them, these hereditary qualities must have been latent, and, in either case, they came from them to Richard Roe. In strictness the inheritance of C, D, E, etc., are included in B, as are also the race qualities and the qualities of the species. To what extent Richard Roe will show personal individuality depends on the value of A as compared with B, B', etc.; in other words, on the lack of uniformity in his pedigree. If B, C, D, and the rest were very closely alike, as is the case with "thoroughbreds," the differential elements will be small, and the complete Richard Roe will be very like the rest of them. If B, C, D, are small quantities, and

A + B essentially similar to A + D, the addition of  $\frac{C, \text{ etc.}}{16 n +}$  will count for but little in the aggregate.

from those seen in the mother. The son cannot inherit all from both sources. Certainly not more than half could come from either source, for the new generation could not be built of peculiarities alone. The old large common heritage must always have precedence. Galton has made a calculation based on wide observations, that on the average twenty-five per cent of the individual peculiarities are directly inherited from each parent. On the average, each parent exerts the same force of heredity. Half the characters come from each, but in each half it would appear that about one-half is lost or rendered unrecognizable by other variation or by contradictory blendings. The first division of qualities in half is necessary and natural, for there are two parents. The second division in half is an arbitrary assumption which seems to find its warrant in Galton's studies. We might assume without theoretical difficulty a third or a fifth as being preserved intact among possible variations and combinations. One-half, however, seems nearer the fact, and to find the fact is the only purpose of theory. To the characters received from the parents we must add the latent influence of grandparents, great-grandparents, and the long series of dead hands which, however impotent, can never wholly let go. As the smallest wave must go on till it crosses the ocean, so the influence of every ancestor must go on to the end of the generations of life. Each of us must feel in a degree the strength<sup>1</sup> or weakness of each one of them. To each grandparent Galton assigns  $6\frac{2}{3}$  per cent. There are four grandparents, and two stages of generation separate them from Richard Roe. Half the force of each, twice lost, seems to give to each grandparent one-fourth the potency in heredity the father or mother has. In the same way, to the great-grandparent we must assign the relation of  $1\frac{9}{16}$  per cent (one-sixty-fourth), and so on.

The "bluer" the blood, that is, the more closely alike these ancestors are, the greater will be the common factor, the less the amount derived from the individual. In perfect thorough-breeding, the individual should have no peculiarities at all. This condition is never reached, but it may sometimes be approximated. In such case the addition of an ancestral sixteenth or sixty-fourth could make no visible change. This may be true among the very bad as well as among the very good. Weakness or badness is more often thoroughbred than strength or virtue. The bluest of blood may run in the veins of the pauper as well as in those of the aristocrat who boasts that  $\frac{W}{2,147,473,648n \pm 1}$  in his formula stands for William the Norman. And for Richard Roe's own sake let us hope that he is not too thoroughbred, and that he has no record of W and W<sup>'''</sup>, nor even of E. Too narrow a line of descent

<sup>1</sup> "Lo, these large ancestors have left a trace

Of their strong souls in mine, defying Death and Time." — H. H. Boyesen.



tends to intensify weaknesses. Vigor and originality come from the mingling of variant elements. Nature does not favor "in-and-in" breeding. There is no loss to the individual if decided and different qualities come from father or mother. Contradictory or even incongruous peculiarities are better than none at all.

Ancestry, too, like wine, becomes stale if it remains too long in the sunshine. An ancestry which is readily traced has lived too long in easy places. Great men are developed in obscurity. A few generations of successful dealing with small matters may prepare the way for the power to deal with great ones. Wisdom is knowing what to do next, and wisdom may exist in humble places as well as in conspicuous fields of action.

Again, at the time of Richard Roe's birth, the formula of his father was slowly changing under the reaction toward activity or to idleness, resulting from his efforts and his circumstances. It is no longer what it was originally. Changes constantly arise from the experiences of life, the stress of environment, the reduction of "mental friction," the formation of automatic nerve-connections or habits, the growth that arises through voluntary effort, the depression coming from involuntary work or idleness, the degeneration through the vitiation of nerve-honesty caused by stimulants or vice, the deterioration due to spurious pleasures that burn and burn out. Each of these may have come to the father of Richard Roe, and each one may have left its mark on him. The fairy's wand and the fool-killer's club each leaves an indelible trace whenever it is used. Through these influences <sup>1</sup> every man is changed from what he was or what he might have been to what he is.

Lamarck's much disputed "Fourth Law" of development reads as follows: "All that has been acquired, begun, or changed in the structure of the individuals in their lifetime is preserved in reproduction and transmitted to the new individuals which spring from those who have inherited the change."

"Change of function produces change of structure," so Herbert Spencer tells us; "it is a tenable hypothesis that changes of structure thus produced are inherited."

But though this may be a tenable hypothesis, the opposite hypoth-

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<sup>1</sup> Let X be the aggregate of gains and Y of losses due to these acquired qualities. In the case of the mother these may be X' and Y'. In this case X and Y and X' and Y' represent large factors, but excessively diverse and varying, affecting in some degree all the qualities contained in the symbols B and B'. Richard Roe's father would then be A + B + X - Y. His mother A + B' + X' - Y'. These added numbers mark the change from what these two ought to have been or would naturally have been toward what they are. How much of this is inherited? How do these characters affect Richard Roe? How much of X and Y shall we place in his formula of life? Some learned investigators, notably August Weismann, say that these changes count for nothing in heredity. X and Y spend their force on the generation that develops them. Acquired characters are never inherited. Other investigators, equally wise, Herbert Spencer for example, do not admit that any gain or loss to the individual is without its effect on succeeding generations, and thus on the species. X and Y are inherited just as B or B' may be.

esis has not been clearly shown to be intenable. It seems to be true that any great physical weakness on the part of Richard Roe's parents would tend to lower his constitutional vigor, whatever the origin of such weakness might be. If so, such weakness might appear as a large deficiency in his power of using his equipment. His vital momentum would be small. It may be, too, that any high degree of training, as in music or mathematics, might determine in the offspring the line of least resistance for the movement of his faculties. Perhaps mental friction in the offspring is less in the directions indicated by the mental efforts of the parent. Perhaps Richard Roe would find mathematics easier had his father devoted his life to exercise of that kind. But we are not sure that this is so. We do not know yet on what terms  $X$  and  $Y$  and  $X'$  and  $Y'$  are passed over to Richard Roe, or whether they are passed on to him at all. In the view of Herbert Spencer  $X$  and  $Y$  are inherited<sup>1</sup> just as  $A$  and  $B$  are. According to Weismann and his followers these are not subjects of heredity at all.

I cannot pretend to say what will be the final decision of science in regard to this vexed question. I venture to suggest that in Lamarck's law and in the theories of many of his modern followers, too high value has been set, not on  $X$  and  $Y$ , but on  $\frac{X}{Q}$  and  $\frac{Y}{Q}$ . On the other hand, if these fractions are really equal to zero, if acquired characters are absolutely of no value in heredity, some problems in biology we have thought easy become tremendously complicated. We must rewrite a large portion of the literature of sociology. We must give a new diagnosis to Ibsen's "Ghosts." We must, in fact, do this in any event, for inheritance such as the Norwegian dramatist pictures belongs not to heredity at all, but is to be sought for among the phenomena of transmission and nutrition. In the same realm are probably the "spent passions and vanished sins" that certain psychologists find trace of in heredity.

One more element, likewise of doubtful value, must be added to the inventory of Richard Roe. This is the element of prenatal influence on the part of his mother.

In the process of evolution, the development of the female has brought her to be more and more the protector and helper of the young. She gives to her progeny not only her share of its heredity, but she becomes more and more a factor in its development.

In the mammalia, the little egg is retained long in the body, and

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<sup>1</sup> Let us assume that they are inherited in some degree, and let us represent this inheritance of acquired characters as  $\frac{X + X' - Y - Y'}{Q}$ . The divisor  $Q$ , affecting acquired characters of the parent, is an unknown quantity of large and perhaps variable value. If large, the value of the fraction will be correspondingly small. In Weismann's view,  $Q$  should equal infinity, in which case  $\frac{X}{Q}$  or  $\frac{Y}{Q}$  would be nothing at all. This would be the symbol of non-inheritance.



fed, not with food yolk, but with the mother's blood. The "gate of gifts" among mammals is not closed with the process of fertilization as it is in the lower forms. If the help of favorable environment can be counted as a gift, this gift continues so long as the influence of the mother remains. By the growth of the human family, the gift of environment becomes a lifelong influence. The father as well as the mother becomes a part of it. In Walt Whitman's words:

His own parents (he that had fathered him and she that had conceived him in her womb and birth'd him),

They gave this child more of themselves than that,

They gave afterward every day, they became part of him.

It has long been a matter of common belief that among mammals a special formative influence is exerted by the mother in the period between conception and birth. The patriarch Jacob is reputed to have made a thrifty use of this influence in dealing with Laban. This belief is part of the folk-lore of almost every race of intelligent men. In translations published by Carmen Silva, that gifted woman whom kind nature made a poet and cruel fortune a queen, we find these words from a Roumanian peasant woman:

My little child is lying in the grass,  
His face is covered with the blades of grass;  
While I did bear the child, I ever watched  
The reaper work, that it might love the harvests;  
And when the boy was born, the meadow said:  
"This is my child."

In the current literature of hysterical ethics, we find all sorts of exhortations to mothers to do this and not to do that, to cherish this and avoid that, on account of its supposed effect on the child to come. Long lists of cases have been reported illustrating the law of prenatal influences. Most of these records serve only to induce scepticism. Many of these are mere coincidences, some are unverifiable, some grossly impossible, and some read like the certificates of patent medicines. There is an evident desire to make a case rather than to tell the truth.<sup>1</sup> The whole matter is much in need of serious study.

Dr. Weismann ridicules all these claims, and believes that all forms of mother's marks, prenatal influences, and the like are relics of mediæval superstition. Other authorities of equal rank, as Prof. Henry F. Osborn, are convinced that these supposed influences exist, and are occasionally made evident. Doubtless most of the current stories of prenatal influ-

<sup>1</sup>For example, Dr. Fearn cites the following case: "A mother witnessed the removal of one of the bones (metacarpal) from her husband's hand, which greatly shocked and alarmed her. A short time after, she had a child who was born without the corresponding bone which was removed from the father." (Report of Med. Assoc. of Ala., 1850, as quoted by Dr. S. B. Elliott in *THE ARENA*, March, 1894, p. 424.) If this statement is true, our ideas of the formation and dissolution of parts of the skeleton must be materially changed. We must believe either that the metacarpal bones are formed just before birth, after all the rest of the skeleton, or else that bones once formed may be at once reabsorbed under the influence of nervous shock or hysteria.

ence are products of self-deception or of plain lying. Probably the period of gestation is too short to produce far-reaching changes in hereditary endowments. On the other hand, doubt and ridicule are not argument, and there may be some reality in influences in which the world has so long believed. But these phenomena, if existing, belong to the realm of abnormal nerve action, as affecting prenatal nutrition, not to heredity. They would be least likely to occur at all in the life of the healthy mother. The less worry given to them the better.

Besides these, there are many phenonema of transmitted qualities that cannot be charged to heredity. Just as a sound mind demands a sound body, so does a sound child demand a sound mother. Bad nutrition before as well as after birth may neutralize the most valuable inheritance within the germ-cell. Even the father may transmit weakness in development as a handicap to hereditary strength. The many physical vicissitudes between conception and birth may determine the rate of early growth, or the impetus of early development. In a sense, the first impulse of life comes from such sources outside the germ-cell and therefore outside of heredity. All powers may be affected by it. Perfect development<sup>1</sup> demands the highest nutrition, an ideal never reached. Thus the child may bear the incubus of Ibsen's "Ghosts," for which it had no personal responsibility. "Spent passions and vanished sins" may impair germ-cells, as they destroy the organs that produce them.

The plan of Richard Roe's life as prepared at birth admits of many deviations. Every wind that blows will change it a little. These elements themselves are of varied character. They do not belong together, nor are they held in place by any "ego," except that made by the cell alliance on which they depend. Experiences of life will tend to reduce or destroy some of these elements. Some of them will be systematic-

<sup>1</sup>The value of the prenatal influences acting upon Richard Roe we may indicate as Z, giving the symbol an indefinite and, if you please, a low value. We must then represent the perfection of transmission by T, and T is a fraction, large or small, but always less than unity. It would stand as a reducing agency, and as such in algebra it would be best represented as a divisor or fraction.

The whole formula may be multiplied by  $\frac{1}{T} \pm$ , a process, like the process Z, which, if it exists, is an extension of T, intervening between conception and birth. Thus at birth we may designate Richard Roe by the formula  $\frac{1}{T} \left( A + \frac{B}{4 \pm n} + \frac{B'}{4 \pm n} + \frac{C}{16 \pm n^2} + \frac{C'}{16 \pm n^2} \text{ etc.} + \frac{D}{64 \pm n^3} + \frac{D'}{64 \pm n^3} \text{ etc.} + \frac{E}{156 \pm n^4} \text{ etc.} + \frac{F}{1024 \pm n^5} \text{ etc.} + \frac{X}{Q} + \frac{X'}{Q} - \frac{Y}{Q} - \frac{Y'}{Q} + Z \right)$ .

This formula may be translated into intelligibility as follows: Richard Roe has the sum of species characters: race characters; one unequal fourth of father's peculiarities; one unequal fourth of mother's peculiarities; one sixteenth of paternal grandfather's peculiarities; one sixteenth from maternal grandfather; one sixteenth from each grandparent; one sixty-fourth from each great-grandparent, etc.; an unknown part of the gain through the father's activity; an unknown part of gain through the mother's activity; an unknown part of loss through the idleness or non-development of each; an unknown chance through prenatal influences received through hysterical conditions of the mother; the whole multiplied or divided by the influences arising from transmission or early cell nutrition. But this at birth he actually is not. These symbols indicate only potentialities. These make up the architect's plan on which his life is to be built.



ally fostered or checked by those who determine Richard Roe's education. The final details will be beyond prediction. The Ego, or self, in the life of Richard Roe is the sum of his inheritance, bound together by the resultant of the consequences of the thoughts and deeds which have been performed by him, and perhaps by others also. Thus each day in his life goes to form a link in the chain which binds his life processes together. The vanished yesterdays are the tyrants of to-morrow. The greater heredity is the heredity made by ourselves.

The art of life is in a large degree the process of "holding oneself together." The Ego is the expression of the result of this process. Just as "England" exists only as the coöperation of all Englishmen, so does the mental Ego exist only in the coördination of nerve-cells. The theory that the Ego is a separate being which plays on the organs of the brain as a musician on the keys of a piano belongs not to science, but to poetry. As well think of England as a disembodied organism that plays on the hearts of Englishmen, leading them to acts of glory or of shame. This, too, might be poetry. It is not fact.

The unity of life, which is its sanity, depends on bringing the various elements to work as one force. Duality or plurality in life, the "leading of a double life" of any sort, is an evidence of some kind of failure or disintegration. "Science finds no Ego, self, or will that can maintain itself against the past." In other words, from the past, its inheritance and its experience, the elements of the present are always drawn. The consciousness of man is not the whole of man. It is not an entity working among materials foreign to itself. It is rather the flame that flickers over embers set on fire long before, and whose burning may go on long after the individual flame has ceased to be.

"The soul," says Dr. Edward A. Ross, "is not a spiritual unit, but a treacherous compound of strange contradiction and warring elements, with traces of spent passions and vestiges of ancient sins, with echoes of forgotten deeds and survivals of vanished habits." Moreover, "science tells us of the conscious and subconscious, of higher nerve-cells and lower, of double cerebrum and wayward ganglia. It hints at many voiceless beings that live out in our body their joy and pain, and scarce give sign — dwellers in the subcentres, with whom, it may be, often lies the initiative when the conscious centre thinks itself free."

Of course, some of the above-quoted phraseology is figurative, and could not be applied literally to the personality — Richard Roe. His consciousness arises from the coöperative action of his higher nerve-cells. That it arises from many, not from any particular one, is the source of the feeling that the consciousness exists apart from them all. But this is only a semblance, and the elements of which his per-

sonality is made have been in one way or another used before him by many others.

With all this, we may be sure that the stream of Richard Roe's life will not rise much above its fountain. He will have no powers far beyond those potential in his ancestors. But who can tell what powers are latent in these? It takes peculiar conditions to bring any group of qualities into general notice. The men who are famous in spite of an unknown ancestry are not necessarily very different from this ancestry. Fame is a jutting crag which may project from a very low mountain. Far higher elevations do not catch the eye if their outline is not unusual. Even under the plebeian name by which "Fate tried to conceal him," Richard Roe may receive a noble heritage. Doubtless it may be passed on to the next generation, not the less noble because it has not been exposed to the distortions of fame. Real greatness is as often the expression of the wisdom of the mother as of anything the father may have been or done. As society is now constituted, the great hearts and brains of the future may be looked for anywhere. They will not fail to come when needed, and in most cases they will appear unheralded by ancestral notoriety.

I said just now that Richard Roe had twice as many ancestors as his father or his mother. This is self-evident, but it is not literally true. There is a vast interlocking of families. Over and over again strains of blood have crossed, and the same person, and therefore the whole of this person's ancestors, will be found in many different places in a single pedigree. The lack of old records obscures this fact. That crossing and recrossing must occur countless times is evident from a moment's consideration. We can show mathematically that the child of to-day must have had at the time of Alfred the Great an ancestry of 870,672,000-000 persons. In the time of William the Conqueror (thirty generations) this number reaches 8,598,094,592. This is shown by the ordinary process of computation — two parents, four grandparents, eight great-grandparents, and so on. As the number of Englishmen in Alfred's time, or even in William's, was but a very small fraction of these numbers, most of these ancestors must have been repeated many times in the calculation. Each person who leaves descendants is a link in the great chain of life, or rather a strand in life's great network. The blood of each single person in Alfred's time who left capable descendants enduring to our day is represented in every family of strict English descent. In other words, every Englishman is descended from Alfred the Great; as very likely also from the peasant woman whose cakes Alfred is reputed to have burned. Moreover, there are few if any who do not share the blood of William the Conqueror. Most ancestral lines, if they could be traced, would go back to him by a hun-



dred different strains. In fact, there are few families in the south and east of England who have not more Norman blood than the present royal family. The House of Guelph holds the throne not through nearness to William, but through primogeniture, a thing very different from heredity.

Mr. Edward J. Edwards, of Minneapolis, has recently sent me some very interesting studies in genealogy yet unpublished. These concern the lineage of his little daughter, my niece, Mary Stockton Edwards.

Mr. Edwards finds that the little girl, like millions of others, is descended through at least two different lines from William the Conqueror. The lineage of one of these leads in thirty-two generations through the family names of Jordan, Hawley, Waldo, Elderkin, Drake, Grenville, Courteney, de Bohun, and Plantagenet to William the Conqueror. Sir Humphrey de Bohun married Elizabeth Plantagenet, daughter of King Edward I. In the ancestry of King Edward are the Saxon kings Cedric, Egbert, Alfred, and Ethelred, while intermarriage with other royal lines brings in Hengist, Hugh Capet, Charlemagne, Otho the Great, Duncan, Rurik, Igor, San Fernando, and a host of other notables of whom one would have less right to be proud. The Courteney, earls of Devon, are again descended from the royal lines of France (Hugh Capet) and Russia, but not from William the Conqueror. To Courteney and Plantagenet again the Edwards lineage has been traced along another and quite different line.

The seventy family names, more or less, traced in the first series, containing perhaps a thousand representatives, are only so many out of billions, if there were no duplications. If there had been no repetitions, there would be instead of the thousand known ancestors, four billions of persons between Mary Stockton Edwards and William the Conqueror. This genealogy is therefore but a strand from an enormous network, which if written out in full would cover the earth with names. Only through the family pride of the Courteney and Drakes this fragment of personal descent and personal history happened to be preserved. By mere chance, the plebeian record of the plebeian descendants of the Puritan John Drake of Windsor forms a junction with the sacred annals of the English peerage.

Most of the English people named in these records lived in Devon and Sussex, from which region their descendants came to America. The subordinate lines traced out lead to the feudal lords of these two counties. The interesting fact, however, is that in this there is nothing exceptional. These people in America were New-England farmers for the most part, squires, and shipwrights, with a lineage or character in no respect singular. Their sole important heritage was "the Puritan conscience."

Studies of this kind show clearly that *primogeniture* is mainly responsible for the difference between Roundhead and Cavalier, between Royalist and Puritan. Roundheads and Puritans were descended from daughters and younger brothers. The "blue blood" flows in England only in the veins of the eldest son. But the eldest sons of the eldest sons form but a very small fragment of the whole. Galton's remark to the effect that the character of England has suffered through the segregation of her strongest representatives as nobility, exposed to the deteriorating influences of ease and unearned power, is scarcely justified. A few individuals have suffered perhaps, but not England. The nobility are only the conspicuous few. The rest have joined the mass of common men whose greatness makes England great.

One of the many daughters of some king marries a nobleman. Later a scion of nobility is joined to some squire. Some daughter of a squire is married to a farmer. The farmer's children thus have royal blood in their veins. Or, by reverse process, plebeian blood may enter — and to its advantage — the bluest of nobility. The thirty generations of Englishmen since William's time each contains a far and wide mixture of blood. That the descendants of the old nobility are alive to-day indicates that in the main each individual has a sound heredity. For a rotten link means the breaking of the chain. Even royal blood is not necessarily degenerate. That which became so has been strengthened by plebeian strains. There can be few if any Englishmen or Americans to-day that have not royal blood in their veins. There is probably not a king living who has not somewhere in his ancestry the bar sinister of the common peasant. For of one blood, after all, are all the nations of the earth, as well as the men that make up these nations.

Another necessary conclusion is this, that race characteristics imply direct personal relationship among those who exhibit them. The Englishmen of to-day are English in temperament because they are related by blood. They are the variously intermingled descendants of some few robust families of a thousand years ago, a hundred thousand of them all at the most. "Saxon and Norman and Dane are we." From these families, Dane, Norman, and Saxon, the weak, the infertile, and the unfortunate are constantly undergoing elimination, leaving the strong and fecund to persist. The withered branches are only continued through the charity which enables the pauper to subsist, or through bad social conditions which propagate the criminal. Pauperism, criminality, and folly have their lineage, but it is not a long one; and wiser counsel will make it shorter than it now is.

This persistence of the strong shows itself in the prevalence of the leading qualities in the dominant strains. To these ruling ancestors every line of genealogy will be found to lead, when we come to fol-



low it backward. We may reach these from one to a thousand times each in the following up of different ancestral lines.

The growth of colonial types of Englishmen comes from the narrowing of the range of crossing and from intermarriage with lines not English. This occurs most frequently outside of England. "What do they of England know who only England know?" This is especially frequent in the United States. But already these varied strains are uniting to form a "Brother Jonathan" as definite in qualities and as "set in his ways" as his ancestor, the traditional "John Bull."

Race types thus arise from the "survival of the existing," its best results being modified and preserved by the "survival of the fittest." Actual presence in a country of certain ancestral types is the first element. Their characters become workable, durable, and at last "ineradicable" by the survival of those persons in whom these traits blend to form an effective character.